

ESTIMATION OF A SOURCE LOCATION OF THE POLLUTANT USING THE RADIOTRACER DATA

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Water pollution according to an expansion of industrial activities and urbanization is investigated from the aspect of the management of water resources. When harmful pollutants enter a river system, it may have a critical impact to the ecology of the river and humans. It is very important to predict the damage from such an accident and understand the movement of pollutants. If the pollutants from the any accident are released in river, it needs to find out the unknown source location in aspects of the water resource management. The methodology for estimating the location of the pollutant sources is based on the solution of the trajectory equation.

In this study, the field tracer experiments using radioisotope were performed to understand the process of the pollutant transport and to determine the dispersion coefficients in river. Radiotracer method is a useful tool for investigating the pollutant dispersion and description of mixing process taking place in natural streams. The main advantage is that tracer detection remains unaffected by such factors as variations in chemical composition of labeled medium and the presence of deposits. A short half-life radioisotope was injected instantaneously into a flow as a point source by means of an underwater glass vial crusher. The detection was made with 2inch NaI (Tl) scintillation detectors bound to the transverse lines at a downstream position. The radioisotope ^{82}Br which is a gamma emitter with a half-life of 35.5 h was used as the trace element in the first experiment. Tc-99m having a short half-life was used with a tracer in the second experiment. Tc-99m milked from a $^{99}\text{Mo}/^{99\text{m}}\text{Tc}$ portable generator fabricated for medical purposes had 0.141MeV of gamma radiation and 6.02 hours of a half-life.

Two-dimensional numerical models were used to simulate the hydraulic parameters and the concentration distributions of the radioisotope injected into the river. Especially, a numerical model for dispersion using the obtained data from a tracer experiment was applied to evaluate the characteristics of a

pollutant's behavior. Also, the trajectory models are developed to estimate the unknown source location and applied to compare the measured one in river. The calculated results showed the reasonable values within error range.